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BIOSKETCH

The Neurophysiology Lab investigates the mechanisms underlying neuronal injury and repair with the central goal of promoting functional recovery following traumatic brain injury (TBI) and spinal cord injury (SCI). Our research focuses on elucidating the molecular and cellular pathways that regulate neurodegeneration and regeneration, as well as developing conductive biomaterials to bridge disrupted axons and restore neuronal communication. Traumatic injuries to the central nervous system result in both primary and secondary damage. While the primary insult causes immediate structural disruption, the following secondary injury involves a cascade of cellular events including excitotoxicity (excessive glutamate release), inflammation, oxidative stress, axonal degeneration, and loss of electrical conductivity all together exacerbate neural dysfunction and limit recovery. Our studies aim to identify key molecular mediators of these secondary injury processes and to integrate conductive materials and synaptic modulators to enhance neuronal survival and connectivity. We employ a multidisciplinary approach combining primary/secondary neuronal cultures, electrophysiological recordings, and ultrastructural analyses to evaluate neuronal function and develop treatment strategies for functional restoration after CNS trauma.

Educational Profile

- **Doctor of Philosophy (Ph.D.) Neurobiology**
  Year of Passing: 2017
  Thesis title: Role of endocannabinoid system and acid sensing ion channels in spinal locomotor circuits
  Thesis Supervisor: Prof. Andrea Nistri MD, Neurobiology Sector, International School for Advanced Studies, Trieste, Italy

- **Master of Science (M.Sc.) in Life Sciences (five year integrated program)**
  Year of Passing: 2011
  School of Life Sciences
  Bharathidasan University
  Tiruchirappalli, India

Positions Held

May 2023 – Present	Assistant Professor Neurophysiology Laboratory Department of Biotechnology PSG Institute of Advanced Studies Peelamedu, Coimbatore
July 2017 – August 2022	Post-doctoral researcher (Synaptic Physiology) Supervisor: Prof. Samuel M. Young Lab, PhD, Department of Anatomy and Cell Biology, Carver College of Medicine, University of Iowa, Iowa City, U.S.A.

Research Areas: (Bullet points)

- Treatment of central nervous system injuries and degeneration by synaptic modulators and electroconductive materials
- Real-time monitoring the extent and progression of neuronal degeneration
- Modulating intrinsic neuronal properties during extreme climatic conditions

Awards & Achievements

- Selected and Awarded for travel to Young Investigator Meeting (YIM-2024), DBT, IISER Bhopal
- Best poster award at EMBO JNCASR workshop, Bengaluru (2022)
- University of Iowa post-doctoral association travel award for attending Gordon Research Conference, New Hampshire (2019)
- Awarded with Federation of European Neuroscience (FENS) fellowship for summer school at Max Planck, Gottingen (2017)
- Awarded with distinction in PhD, Trieste (2017)
- Awarded with Summer research fellowship by Indian Academy of Sciences (2010)
- Best poster certificate in "Brain Aging and Dementia" International Symposia, Varanasi (2010)
- Best contributor for *Mycobacterium tuberculosis* genome reannotation, New Delhi (2010)
- Awarded with Post-Graduate Indira Gandhi single daughter scholarship, Tiruchirappalli (2009-11)
- Endowment award for M.Sc., Tiruchirappalli (2008-09)

Research Scholars (Ongoing)

Student Name: Ms. T. Janani

Project Title: Functional Recovery of Neurons Post Injury by Modulating G-Protein Coupled Receptors and by Providing Conductive Support

Email: jan@psgias.ac.in

Laboratories In-charge

1. Neurophysiology Laboratory

Invited Talks

- Invited Talk: "Neuronal Firing to Network Function: What to Expect from Computational Tools?"at Department of Bioinformatics, Bharathiar University, Coimbatore, India (2024)
- Centre Inauguration Short Talk: Inaugural short talk at "Centre for High Impact Neuroscience and Translational Applications (CHINTA)", Kolkatta, India (2024)
- Invited conference talk: "Senses to Synapses" at the International Conference on Research Trends, Strategies, and Technical Advancements in Biological and Biomedical Sciences for Sustainability, Seethalakshmi Ramaswamy College, Tiruchirappalli, India (2022)
- Podium talk: "Spatial coupling of Ca^{2+} entry to synaptic vesicles required for ultrafast synaptic transmission is not unique to presynaptic $Ca_V2.1$ channels" at the Midwest Auditory Research Conference, The Kresge Hearing Research Institute, Ann Arbor, U.S.A. (2022)
- Meeting short talk: "Role of presynaptic Ca_V2 channels in regulating synaptic vesicle release" at Young Investigators' Meeting, India (Virtual, 2022)
- Invited Course Seminar: "Neuronal Ion Channels-The Master of Orchestration" for skill certificate course on "Counselling Skills on Genetic Disorders" at Department of Human Genetics and Molecular Biology, Bharathiar University, Coimbatore, India (Virtual, 2021)
- Invited Guest Seminar: "Voltage gated calcium channels-Role in neurotransmitter release" at Department of Human Genetics and Molecular Biology, Bharathiar University, Coimbatore, India (2018)

Journal Publications

- Bartholomew Richard, Manjusha Mathew, T. Janani, Jithin Thomas Chacko, Kannankuzhiyan Niyas, Priyadharishini Veeraraghavan, P Abdul Rasheed. Silane-Coupling Impelled Metal Oxide-MXene Proximity: An Electrochemical Probe for Tracking enteral histaminosis In Vitro. (2025, Under review in ACS Biomaterials Science & Engineering)
- Li J, Veeraraghavan P, Young SM Jr (2024). Ca_V 2.1 α1 subunit motifs that control presynaptic Ca_V 2.1 subtype abundance are distinct from Ca_V 2.1 preference. J Physiol. 602 (3):485-506.
- Philips S, Valino-Ramos P, Veeraraghavan P, Young SM Jr (2021) VikAD, a site-specific recombinase-based system for efficient and scalable helper-dependent adeno virus. Mol Ther Methods Clin Dev. 24:117-126
- Young SM Jr, Veeraraghavan P (2021) Presynaptic voltage-gated calcium channels in the auditory brainstem. Mol Cell Neurosci. 112:103609
- Radulovic T, Dong W, Goral RO, Thomas CI, Veeraraghavan P, Montesinos

MS, Guerrero- Given D, Goff K, Lübbert M, Kamasawa N, Ohtsuka T, Young SM Jr (2020) Presynaptic development is controlled by the core active zone proteins CAST/ELKS. J Physiol. 598:2431-52

- Petrovic A, Veeraraghavan P, Olivieri D, Nistri A, Jurcic N, Mladinic M (2019) Loss of inhibitory synapses causes locomotor network dysfunction of the rat spinal cord during prolonged maintenance in vitro. Brain Res. 1710:8-21
- Mazzone GL, Veeraraghavan P, Gonzalez-Inchauspe C, Nistri A, Uchitel OD (2017) ASIC channel inhibition enhances excitotoxic neuronal death in an in vitro model of spinal cord injury. Neuroscience. 343:398-410
- Veeraraghavan P, Dekanic A, Nistri A (2016) A study of cannabinoid-1 receptors during the early phase of excitotoxic damage to rat spinal locomotor networks in vitro. Neuroscience. 333:214-228
- Medelin M, Rancic V, Cellot G, Laishram J, Veeraraghavan P, Rossi C, Muzio L, Sivilotti L, Ballerini L (2016) Altered development in GABA co-release shapes glycinergic synaptic currents in cultured spinal slices of the SOD1(G93A) mouse model of amyotrophic lateral sclerosis. J Physiol. 594:3827-3840
- Veeraraghavan P, Nistri A (2015) Modulatory effects by CB1 receptors on rat spinal locomotor networks after sustained application of agonists or antagonists. Neuroscience. 303:16-33